

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Exam: Function Reflections (Solution version 15)**

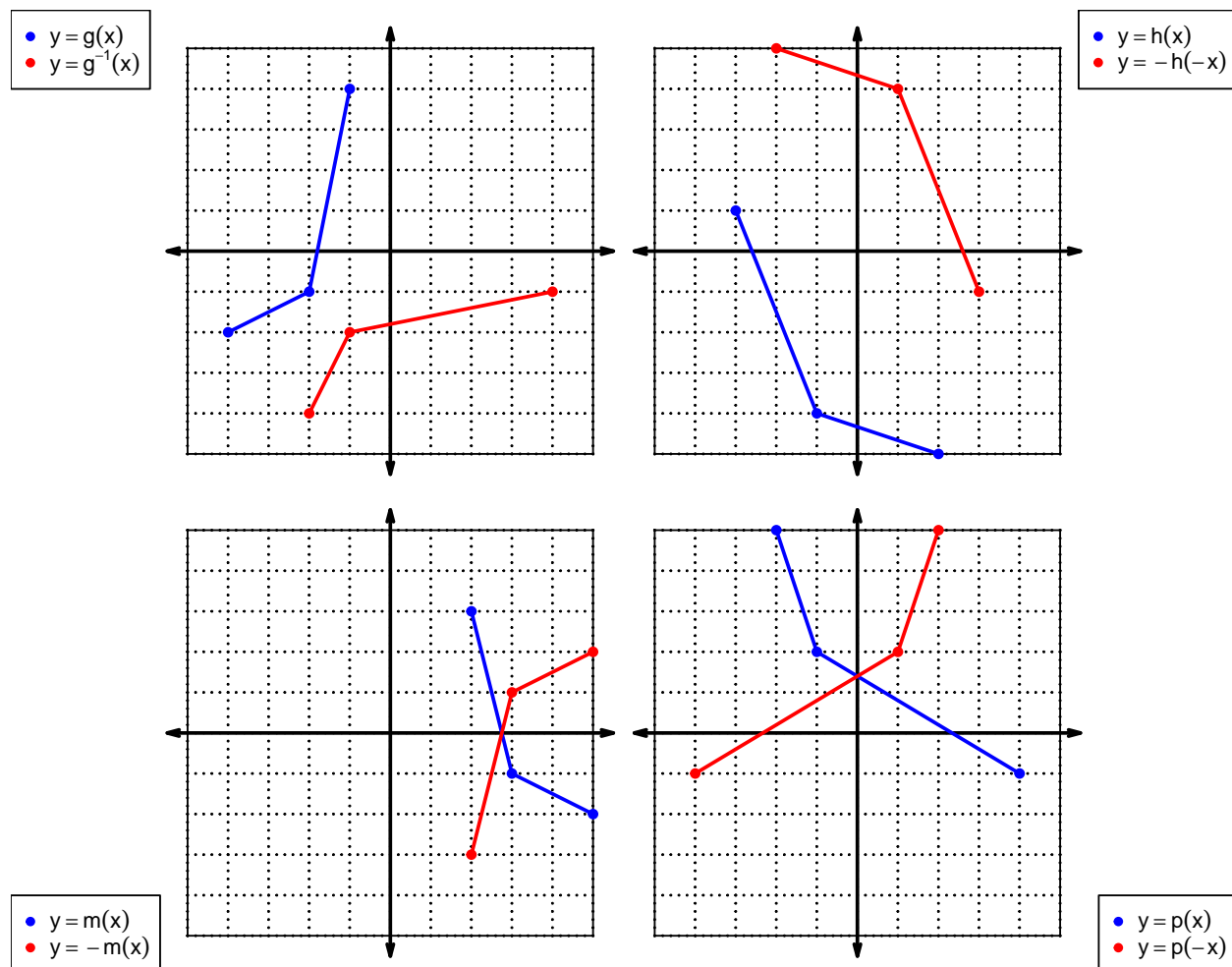
1. Let function  $f$  be defined by the polynomial below:

$$f(x) = -8x^4 - 3x^3 - 9x^2 - 2x + 7$$

Draw lines that match each function reflection with its polynomial:

Reflections		Polynomials
$-f(-x)$	●	$-8x^4 + 3x^3 - 9x^2 + 2x + 7$
$-f(x)$	●	$8x^4 + 3x^3 + 9x^2 + 2x - 7$
$f(-x)$	●	$8x^4 - 3x^3 + 9x^2 - 2x - 7$

2. In each  $xy$  plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The  $x$  axis is horizontal and the  $y$  axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions  $f$ ,  $g$ , and  $h$  are defined by the table below.

$x$	$f(x)$	$g(x)$	$h(x)$
1	8	7	6
2	3	1	4
3	6	9	7
4	7	5	3
5	1	3	9
6	9	4	8
7	4	2	5
8	5	6	2
9	2	8	1

3. Evaluate  $f(6)$ .

$$f(6) = 9$$

4. Evaluate  $g^{-1}(7)$ .

$$g^{-1}(7) = 1$$

5. By filling more rows of the table, it is possible to make function  $h$  **odd**. If that were done, what would be the value of  $h(-3)$ ?

If function  $h$  is odd, then

$$h(-3) = -7$$

6. By filling more rows of the table, it is possible to make function  $g$  **even**. If that were done, what would be the value of  $g(-8)$ ?

If function  $g$  is even, then

$$g(-8) = 6$$

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7. A function,  $f$ , is **even** if  $f(x) = f(-x)$  for all  $x$  in the domain. A function,  $g$ , is **odd** if  $g(x) = -g(-x)$  for all  $x$  in the domain.

Let polynomial  $p$  be defined with the following equation:

$$p(x) = -x^3 + 1$$

- a. Express  $p(-x)$  as a polynomial in standard form.

$$p(-x) = -(-x)^3 + 1$$

$$p(-x) = x^3 + 1$$

- b. Express  $-p(-x)$  as a polynomial in standard form.

$$-p(-x) = -(x^3 + 1)$$

$$-p(-x) = -x^3 - 1$$

- c. Is polynomial  $p$  even, odd, or neither?

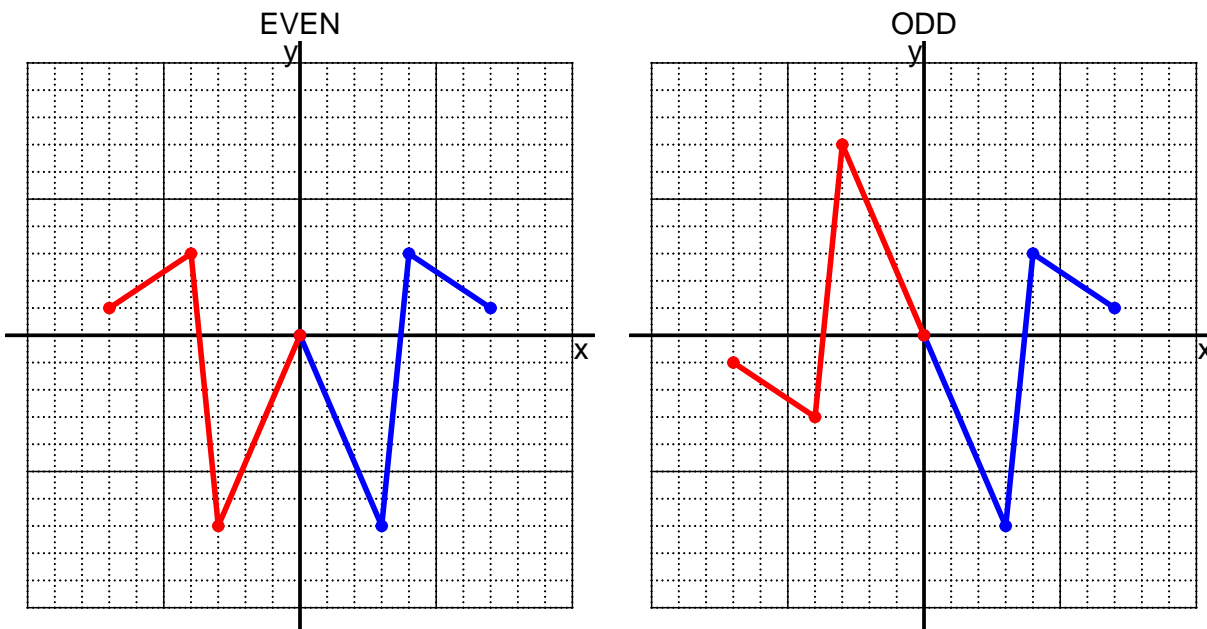
neither

- d. Explain how you know the answer to part c.

We see that  $p(x)$  is not equivalent to either  $p(-x)$  or  $-p(-x)$ , so  $p$  is neither even nor odd.

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8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function  $f$  be defined with the equation below.

$$f(x) = \frac{x+6}{2}$$

- a. Evaluate  $f(8)$ .

step 1: add 6

step 2: divide by 2

$$f(8) = \frac{(8)+6}{2}$$

$$f(8) = 7$$

- b. Evaluate  $f^{-1}(35)$ .

step 1: multiply by 2

step 2: subtract 6

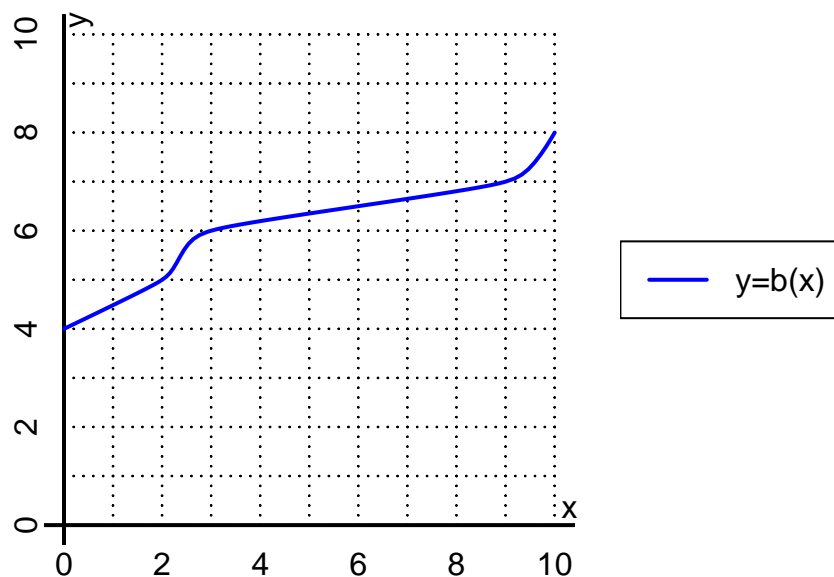
$$f^{-1}(x) = 2x - 6$$

$$f^{-1}(35) = 2(35) - 6$$

$$f^{-1}(35) = 64$$

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10. The function  $b$  is represented by the curve  $y = b(x)$  graphed below.



a. Evaluate  $b(2)$ .

$$b(2) = 5$$

b. Evaluate  $b^{-1}(6)$ .

$$b^{-1}(6) = 3$$

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11. Function  $f$  is defined by the table below.

a. Complete the columns for  $-f(x)$  and  $f(-x)$  and  $-f(-x)$ .

$x$	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-3	3	-3	3
-1	5	-5	5	-5
0	0	0	0	0
1	5	-5	5	-5
2	-3	3	-3	3

b. Is function  $f$  even, odd, or neither?

even

c. How do you know the answer to part b?

Function  $f$  is even because column  $f(-x)$  matches column  $f(x)$  exactly.